

**OR146***Testing inclusive fitness theory in a lower termite***Judith Korb**, Katharina Hoffman

Kin selection theory has been repeatedly debated and while it has been most successfully applied to understand conflict and sex allocation in social Hymenoptera, rigorous tests for other social taxa are scarce. Termites evolved sociality independently from social Hymenoptera and due to a lack of haplodiploidy conflicts such as those observed in Hymenoptera are predicted to be absent. Yet, termites offer a promising test case to study the interaction between relatedness and altruism because different termite castes vary in degree of altruism: Soldiers are always sterile and can only gain indirect fitness. In contrast, workers of wood-dwelling lower termites are immature instars that are less altruistic and have the full capability to become reproductives. They can either become winged sexuals that found new colonies or they can inherit the natal colony as replacement reproductives. Inclusive fitness theory predicts that relatedness should be more crucial in influencing soldier's behavioural interactions (kin discrimination) than that of workers. This we tested in the drywood termite *Cryptotermes secundus* where within-colony relatedness varies dramatically due to the common occurrence inbreeding ( $r > 0.5$ ) and fusions of colonies ( $r < 0.5$ ). As predicted, soldiers were more nepotistic than workers. Even more interesting, in both castes the adjustment was a phenotypic plastic response and kin discrimination only occurred during critical ecological conditions (e.g. food restriction). Our study demonstrates that as predicted by inclusive fitness theory it is the interaction between benefits/costs and relatedness that is key to social evolution. Hence, studies that investigate relatedness only, can be misleading and a holistic approach including all factors of Hamilton's rule should be applied.